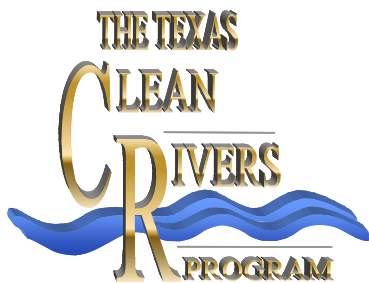


2009

Upper Neches Basin Highlights Report



Prepared in cooperation with the
Texas Commission on Environmental Quality
under the authorization of the
Texas Clean Rivers Act



The Angelina & Neches River Authority (ANRA) is an independent governmental agency of the State of Texas created by the Texas Legislature in 1977. It is authorized to construct, maintain, and operate any and all works necessary for the purpose of controlling, storing, and preserving the water resources in a 17 county area in the Neches River Basin. ANRA is governed by a nine member Board of Directors appointed by the Governor of Texas to six year terms. ANRA receives no tax revenues from the state nor can it levy any taxes. Revenues are derived solely from the services provided and through customer contracts. Revenue bonds can be issued for the purpose of financing projects in the basin. The current functions of ANRA are water quality management, water resource development, water/wastewater utilities, and water conservation.

Texas Clean Rivers Program

The Texas Clean Rivers Program was created in 1991 by the state legislature to assess, maintain and improve the quality of water resources within each river basin in Texas. Through an ongoing partnership between the Texas Commission on Environmental Quality, river authorities, regional entities, industry, citizens, and other local, state and federal agencies, the Clean Rivers Program (CRP) utilizes a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action and work to implement those actions. ANRA has served as the CRP regional planning agency in the Upper Neches Basin since the inception of the program. The CRP is funded through fees from water/wastewater permits issued by the state. A Steering Committee consisting of basin stakeholders representing government, industry, and public interests provide input and guidance at regular meetings. These public meetings also provide a forum for citizens to participate with ideas and express any concerns involving water quality issues in the basin.

Upper Neches River Basin

The Upper Neches River Basin originates in southwest Van Zandt county and extends southeasterly through the Piney Woods of East Texas to the confluence of the Angelina and Neches Rivers at B.A. Steinhagen Lake. For Clean Rivers Program assessment purposes, the Neches River Basin is divided into upper and lower study areas. ANRA is responsible for the upper region and the Lower Neches Valley Authority (LNVA) in Beaumont reports on the lower region. The Upper Neches region is primarily located within the South Central Plains eco-region and encompasses approximately 7,451 square miles. There are nine classified river segments consisting of two major reservoirs, eight water supply lakes, and the future Lake Columbia on Mud Creek. The principal tributaries in the basin are Mud Creek, Striker Creek, East Fork Angelina River, Piney Creek, Attoyac Bayou, and Ayish Bayou. The cities of Tyler, Jacksonville, Nacogdoches, and Lufkin are located in the river basin.



ANRA is a proud participant in the annual Neches River Rendezvous.

Highlights of 2008

The Basin Highlights Report provides an annual update of the current water quality activities and events in the Upper Neches River Basin. The 2008 highlights included Hurricane Ike, ongoing water quality monitoring at 24 stations, metals monitoring, 24 hr. measurements, analytical testing provided by the ANRA Laboratory, and increased public outreach and volunteer monitoring. ANRA also started an intensive watershed monitoring program in 2008, funded by a grant from the TX Water Development Board.

Hurricane Ike

Hurricane Ike passed through the Upper Neches Basin in 2008. The strong winds and heavy rains filled the local waterways with debris and overland runoff water. The organic debris from the strong winds increased the amount of organic nutrients and leaf debris (tannins) in the water. The heavy rains increased the amount of sediment and the runoff water brought temporarily increased bacteria levels and other undesirable debris to our surface water.



Strong winds from Hurricane Ike caused extensive damage in east Texas

Although east Texas experienced widespread damage from the hurricane force winds, the rain passed through rather quickly and did not cause any serious flooding in our creeks and rivers.

Water Quality Monitoring

The FY 2008 monitoring schedule included 24 routine stations, as well as 1 intensive monitoring station looking at concerns of elevated bacteria.



City of Tyler staff collecting water samples under the TX Clean Rivers Program

The City of Tyler began monitoring quarterly in FY 2004 at four stations in the basin and will continue their quarterly monitoring. The TCEQ regional water quality staff have also increased their monitoring activities within the basin, particularly on Lake Palestine. This Basin Highlights Report provides an overview of all water quality monitoring activities in the basin

Metals Monitoring

During 2008, ANRA conducted metals analysis sampling under the TCEQ's Surface Water Quality Monitoring division (SWQM). Samples for metals analysis were collected at four sites on a quarterly basis. These are located at Buck Creek at FM 1818, Biloxi Creek at FM 1818, Piney Creek at FM 1987, and Jack Creek at FM 2497. ANRA has also continued this sampling through FY 2009. All of the samples are shipped promptly to the TCEQ laboratory in Houston for analysis.



Collecting water samples for metals analysis

24 Hour Monitoring

ANRA collected 24 hour measurements at two monitoring stations three times during FY 2008. This type of monitoring involves deploying a water quality instrument for a minimum of 24 hours. The primary focus of these measurements is the dissolved oxygen and how it changes over the 24 hour period as well as the seasonal variations. Other parameters are also collected such as pH, conductivity, and water temperature.



Water quality "Multiprobe" used for 24 hour measurements as well as routine water testing

Highlights of 2008 (continued)

Public Outreach/ Volunteer Monitoring

During FY 2008, ANRA continued its volunteer support for environmental water quality monitoring within the Upper Neches River Basin. New volunteers have been certified through the Texas Stream Team Program (formerly known as Texas Watch). The new volunteer water monitors are conducting water quality testing on Lake Palestine as well as LaNana Creek in Nacogdoches. More information on public outreach and the volunteer water quality monitoring program can be found on page 12.



Texas Stream Team volunteer water quality monitoring training held at Lake Palestine.

ANRA Laboratory Accreditation

During FY 2008, ANRA's Environmental Laboratory conducted all of the routine analytical testing for the Clean Rivers Program in the basin with the exception of Chlorophyll-a analysis, which was performed by the Lower Colorado River Authority's Environmental Laboratory Services. In addition to the CRP, other basin monitoring programs which provide data to the CRP (i.e., The City of Tyler) utilized the ANRA Laboratory as well. During FY 2008, ANRA applied for accreditation under the National Environmental Laboratory Accreditation Program (NELAP) adopted by the TCEO. The goal of this program is to establish a uniform standard to assure that all laboratories are generating environmental data of known and acceptable quality. An Interim Certification was granted to the ANRA Environmental Laboratory in FY 2008. Recently, the ANRA Laboratory underwent an on-site assessment to verify the laboratory's compliance with the standard, which is one of the final steps before the certification process is complete.

Source Water Assessment Grant Monitoring Project

ANRA was recently awarded a Research and Planning Grant from the Texas Water Development Board. In planning for the future Lake Columbia, this project will serve as a source water assessment for the future reservoir site.

This project will evaluate the quality of the source water of a reservoir prior to the construction and treatment for drinking water and other designated use purposes. The source water assessment information, by identifying relative threats to water quality, can help the planning agency (ANRA) determine protection priorities for addressing these threats.

As a major component of the source water assessment, ANRA has been sampling and testing the water quality in Mud Creek, as well as West Mud Creek and Kickapoo Creek (direct tributaries to Mud Creek), in Cherokee and Smith Counties, in what will become Lake Columbia. The proposed sampling and testing includes seven sampling locations, with each location being sampled monthly for a period of one year. The one year sampling period will not only allow for observing changes due to seasonal variation, but could also potentially assess changes due to such factors as intermittent rainfall. The parameters being tested for will provide a comprehensive analysis of the water quality conditions at the reservoir site.

Additional monitoring data will afford ANRA the following opportunities:

- Establish baseline water quality conditions in Mud Creek for a variety of constituents important to human health and aquatic life.
- Identifying changes from previous monitoring data will allow ANRA to evaluate the significance of changes, and where appropriate, investigate and seek a solution to significant pollutant sources.
- Identify and address non-point and point source contamination if necessary, prior to the impoundment of reservoir waters.
- Evaluate the effects of urbanization in the upper watershed on water quality in Mud Creek.
- Develop a water quality protection strategy that will benefit all users of Lake Columbia.

Previous water quality studies in this area have addressed routine nutrient criteria. This project has expanded upon this testing and extended the scope to include metals such as cadmium, mercury and lead, volatile and semi-volatile organics, polychlorinated biphenyls (PCB's), herbicides, pesticides, and other toxic materials that pose concerns for human health. Many of these substances are toxic and/or potentially carcinogenic, and by testing for them at this stage, potential sources of these hazardous chemicals can be identified and addressed prior to the impoundment of water at the future reservoir site.

The data generated from this research project will add to the body of knowledge regarding water quality in this portion of the Neches River basin. Sampling and analysis under this project began in January 2009, and will continue monthly for a period of one year.

Overview of Water Quality Monitoring Programs

Through the Clean Rivers Program, ANRA conducts a basin-wide Surface Water Quality Monitoring (SWQM) Program that was established in 1996 to collect scientifically valid water quality data. Annual coordinated monitoring meetings are used to develop the monitoring schedules. All monitoring entities in the basin are invited to attend these meetings. The current FY 2009 Upper Neches Basin coordinated monitoring schedule, which includes ANRA, City of Tyler, and TCEQ monitoring stations (with parameters, frequencies and monitoring types), is available at <http://cms.lcra.org/>

Types of Monitoring

Routine Monitoring is conducted in order to document long-term water quality conditions and characteristics over a variety of seasonal and flow conditions at fixed stations throughout the basin. ANRA currently performs quarterly routine monitoring at 24 routine stations in the basin. In addition, the City of Tyler is monitoring four stations in the upper basin. All of these **Routine** Monitoring events are coded as **RT** on the coordinated monitoring schedule.

24 Hour Monitoring is designed primarily for the collection of 24-hour dissolved oxygen measurements, although other field parameters are collected. Prior to FY2008, these measurements were coded as: **DI** on the monitoring schedule. Beginning in FY08, 24 hour measurements are now coded as **"BS"** which stands for Bias Season. This monitoring code reflects the monitoring that is targeted toward a specific time of the year (for example, critical or index period). 24 hour measurements are essential for characterizing the aquatic life use of a water body. These measurements allow scientists to analyze the daily variation in an aquatic system that cannot typically be seen with grab samples. ANRA staff is currently conducting 24 hour (**BS**) monitoring at 2 stations within the basin.

Water Quality Parameters

ANRA utilizes a variety of physical and chemical parameters to monitor the water quality in the basin. The following is a brief explanation by category of the various wa-

ter quality parameters collected and analyzed by ANRA's monitoring programs.

Field Parameters

The field parameters are measured on-site by ANRA staff and include pH, Temperature, Dissolved Oxygen, Conductivity, Flow, and Transparency. These parameters indicate the general health of an aquatic system. Great variations from routine conditions can cause serious health and reproductive problems in aquatic organisms. Just like the air we breathe, dissolved oxygen (DO) is used in respiration by aquatic organisms. D.O. is an important measure of the quality of the habitat and overall health of the ecosystem. pH is a measure of the acidity of the water. Most organisms have a preferred pH range of 6 to 9. Conductivity is a good indicator of the dissolved mineral content in stream ecosystems. Temperature is also very important since many aquatic organisms are adapted to survive and prosper within specific temperature ranges. Water temperature also has a direct effect on the amount of dissolved oxygen in the water. As the temperature rises, the amount of dissolved oxygen in the water decreases. In extreme cases, this can lead to fish kills.

Bacteria

E. coli is the indicator bacteria used to identify threats for contact recreation use. High levels of these bacteria could mean that harmful enteric pathogens and viruses are present. *E. coli* is a coliform bacteria which is associated with sewage, because it is derived from the digestive tract of mammals. Exposure to high levels of this bacteria can lead to sickness in humans.

Conventional Parameters

Total Dissolved Solids (TDS) is a direct measurement of the dissolved mineral content. High TDS can be harmful to aquatic organisms and can restrict the beneficial use of the water. Total Suspended Solids (TSS) can adversely affect stream ecosystems by filling pools, clogging gills, and limiting the light penetration and transparency critical to aquatic flora. TDS, TSS, Chloride and Sulfate are common constituents of wastewater and source waters. Their presence can

create water that is aesthetically unpleasing, and in high concentrations may cause unwanted physiological reactions in aquatic organisms, especially aquatic plants.

Total phosphorus includes phosphorus that is bound to sediment particles or inorganic compounds, which can become available in the water column. It is often the limiting nutrient for aquatic vegetation in freshwater systems. Orthophosphate measures the form of phosphorus that is readily available to aquatic organisms. Too much phosphorus can often cause excessive aquatic vegetation growth referred to as eutrophication. Eutrophication is defined as the process of enrichment of a water body due to an increase in nutrient loading. Elevated levels of Nitrate+Nitrite are good indicators of runoff from irrigation, fertilizers, and effluent waste water streams. Nitrogen is a limiting factor to algal production in many freshwater systems. Excess Ammonia-Nitrogen can cause toxicity in fish. The toxicity of ammonia is dependent on pH and temperature. Chlorophyll-a is an indirect measure of algal density. Excess levels may result in harmful swings in the DO concentrations and decrease the water clarity.

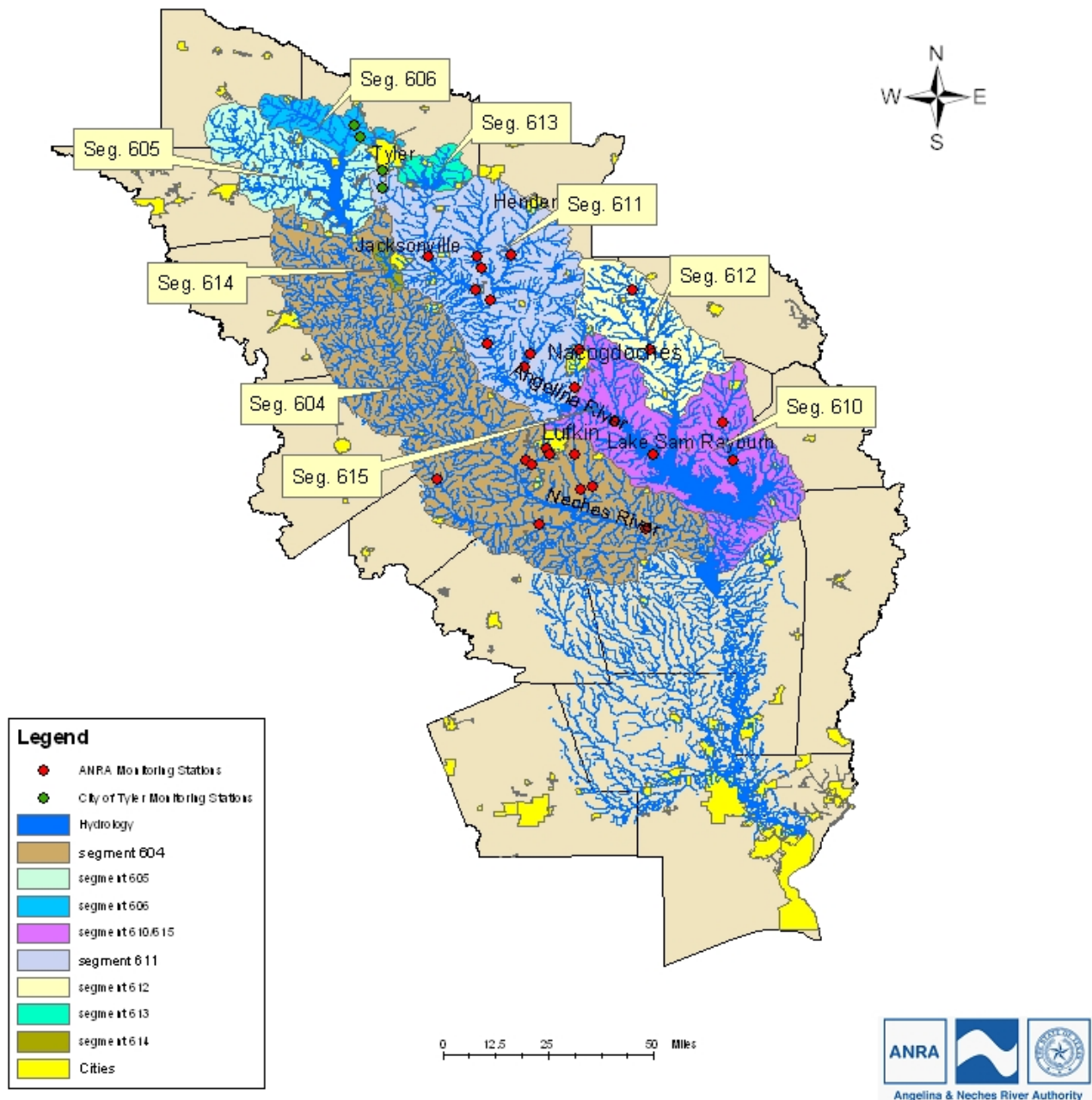
Water Quality Assessment

A complete assessment of the water quality in the Upper Neches river basin can be found in ANRA's 2008 Basin Highlights Report located in the "CRP Reports" section at:

http://www.anra.org/index_cleanrivers.htm

The water quality rankings and assessment information was based on the 2008 Water Quality Inventory and 303(d) List was prepared by TCEQ and approved by the EPA. The 2008 assessment is based on a five year period of recorded water quality data. The data used for the assessment is acquired through the Texas Clean Rivers Program and TCEQ's Regional staff, and other quality assured sources. A link to the 2008 Water Quality Inventory and 303(d) List is provided on the Useful Links page at the end of this document. The list is produced every two years, and the next assessment will be finalized in 2010.

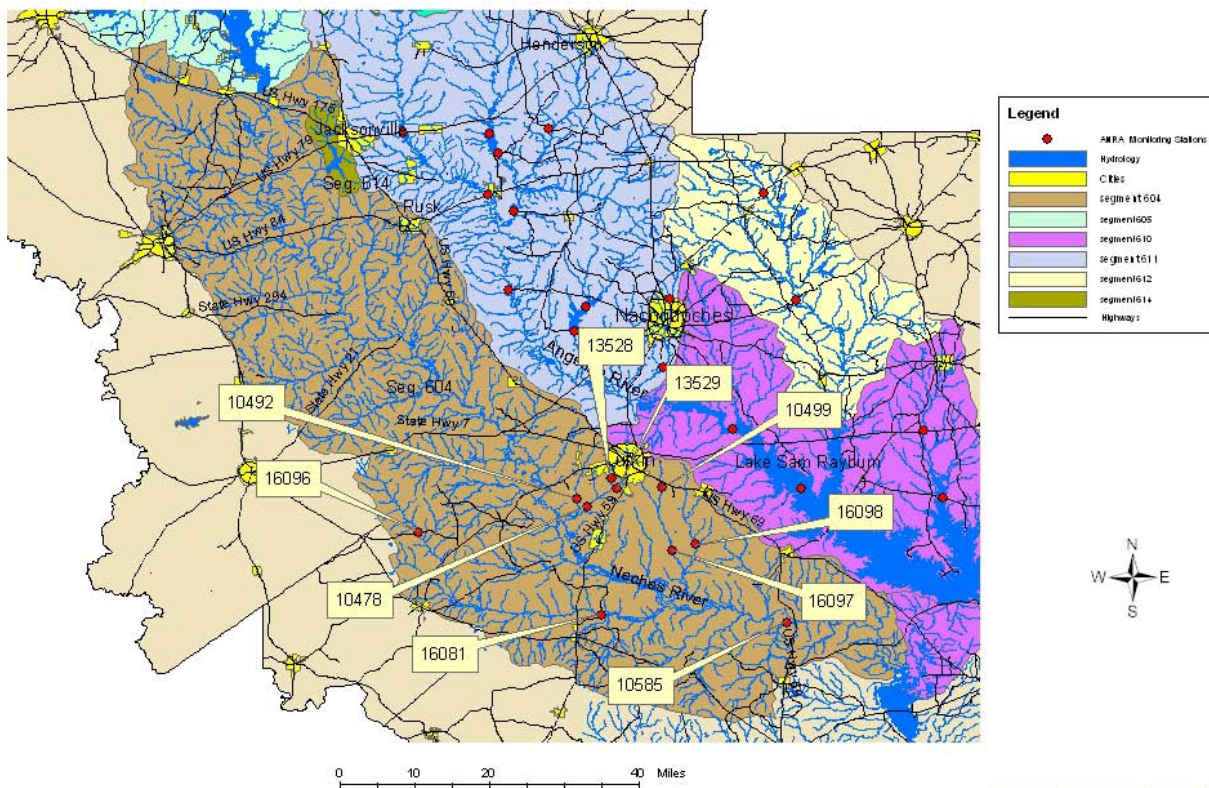
Upper Neches River Basin FY 2009



Segment 604 - FY 2009 CRP Monitoring Schedule

ANRA Monitoring Stations								
Station ID	Station Description	Program Code	Monitoring Parameters					
			24 HR Monitoring	Metals Water	Conventional	Bacteria	Inst. Flow	Field
10478	Cedar Creek at FM 2497	RT			4	4	4	4
13528	Cedar Creek at CR 1336	RT			4	4	4	4
13529	Hurricane Creek at FM 324	RT			4	4	4	4
16081	Piney Creek at FM 1987	RTBS	3	4				4
16096	Piney Creek at FM 358	RT			4	4	4	4
16098	Buck Creek at FM 1818	RT		4	4	4	4	4
16097	Biloxi Creek at FM 1818	RT		4	4	4	4	4
10492	Jack Creek at FM 2497	RT		4	4	4	4	4
10585	Neches River at US 69	RT			4	4	4	4
10499	Biloxi Creek at Angelina CR 216	RT/BS	3			6	6	

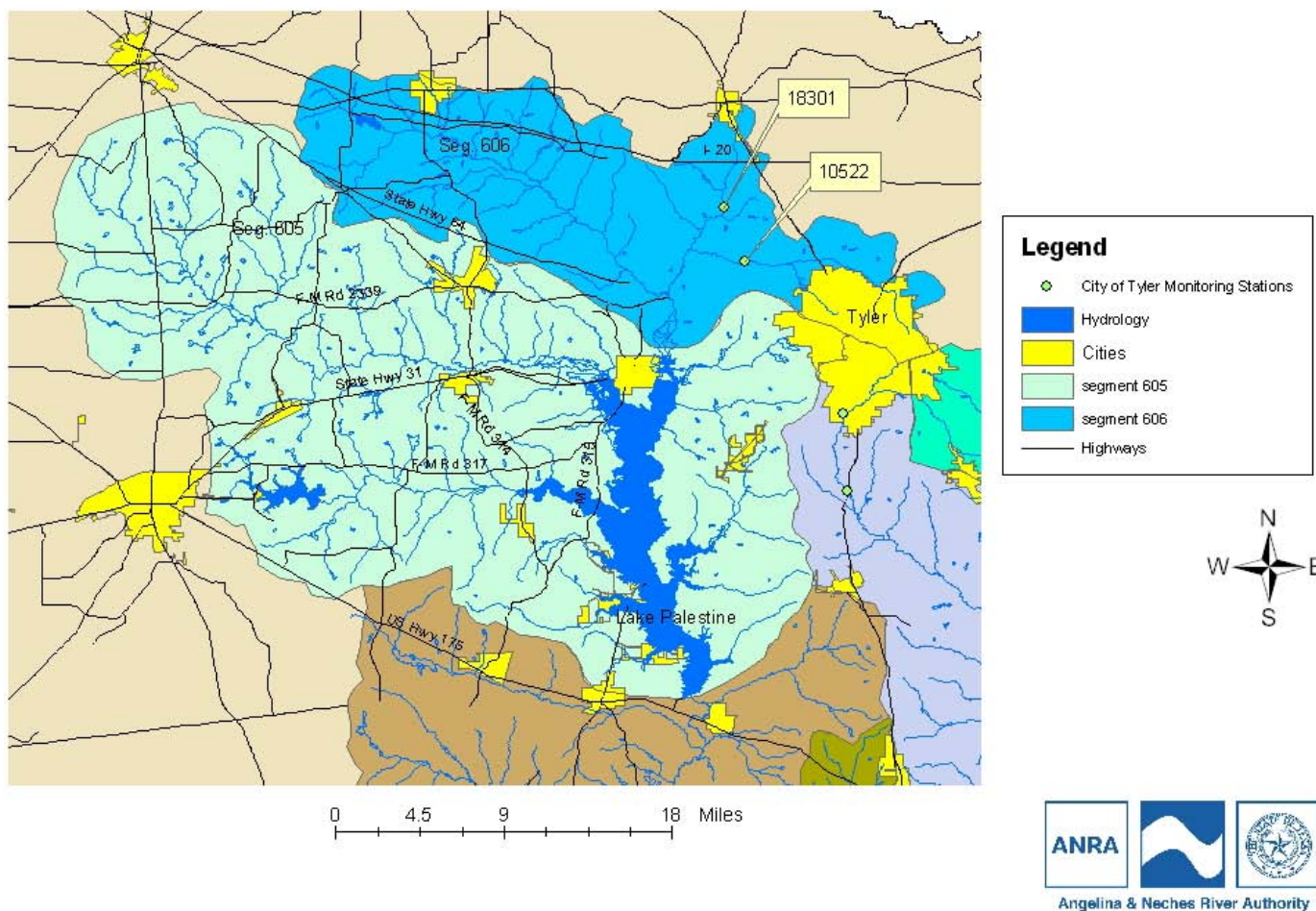
Segment 604 Monitoring Stations FY 2009



Segment 605/606 - FY 2009 CRP Monitoring Schedule

City of Tyler Monitoring Stations								
Station ID	Station Description	Program Code	Monitoring Parameters					
			24 HR Monitoring	Metals Water	Conventional	Bacteria	Inst Flow	Field
10522	Black Fork Creek upstream of Tyler WWTP (City of Tyler)	RT			4	4	4	4
18301	Prairie Creek at SH 110 (City of Tyler)	RT			4	4	4	4

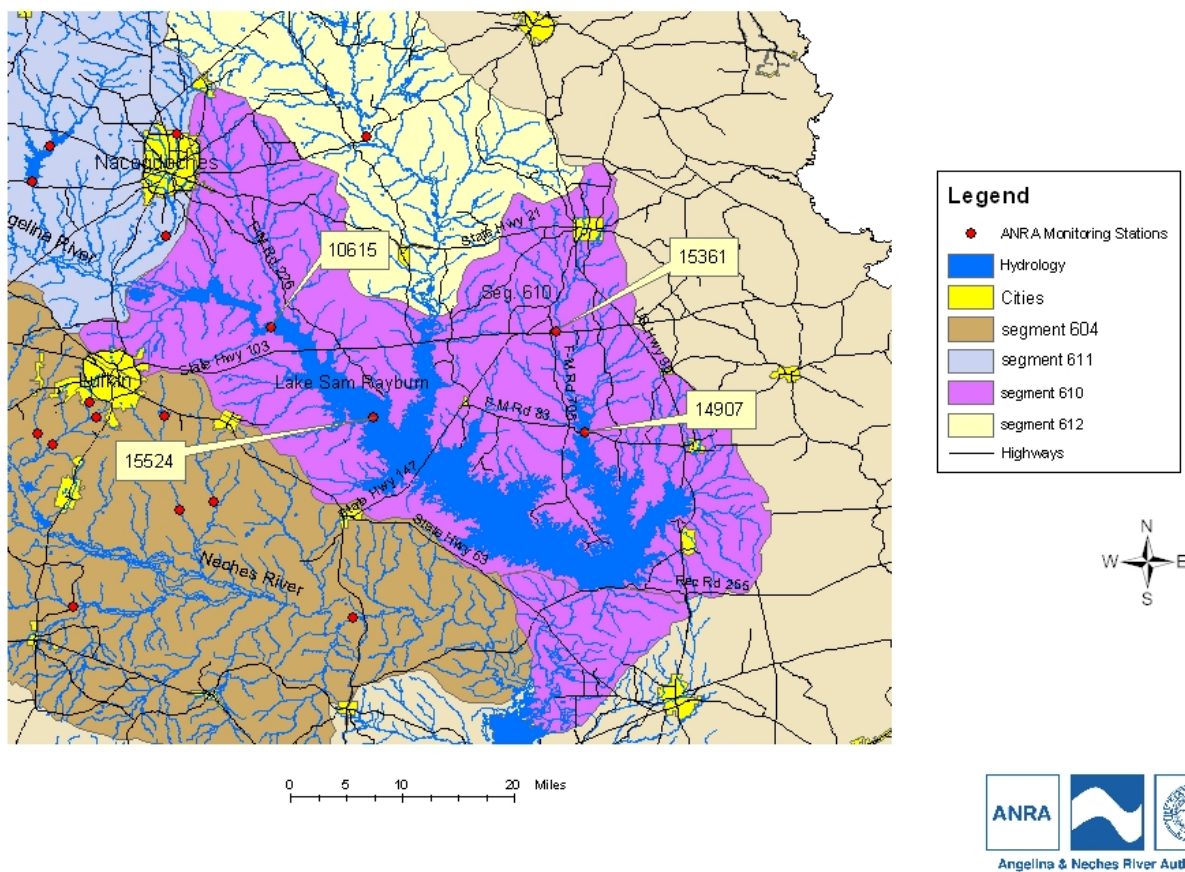
Segments 605 and 606 Monitoring Stations FY 2009



Segment 610/615 FY 2009 CRP Monitoring Schedule

ANRA Monitoring Stations								
Station ID	Station Description	Program Code	Monitoring Parameters					
			24 HR Monitoring	Metals Water	Conventional	Bacteria	Inst. Flow	Field
15361	Ayish Bayou at SH 103	RT			4	4	4	4
15524	Sam Rayburn Reservoir near Shirley Creek	RT			4	4		4
10615	Sam Rayburn Reservoir near Marion Ferry	RT			4	4		4
14907	Sam Rayburn Reservoir at FM 83 bridge	BS	3					

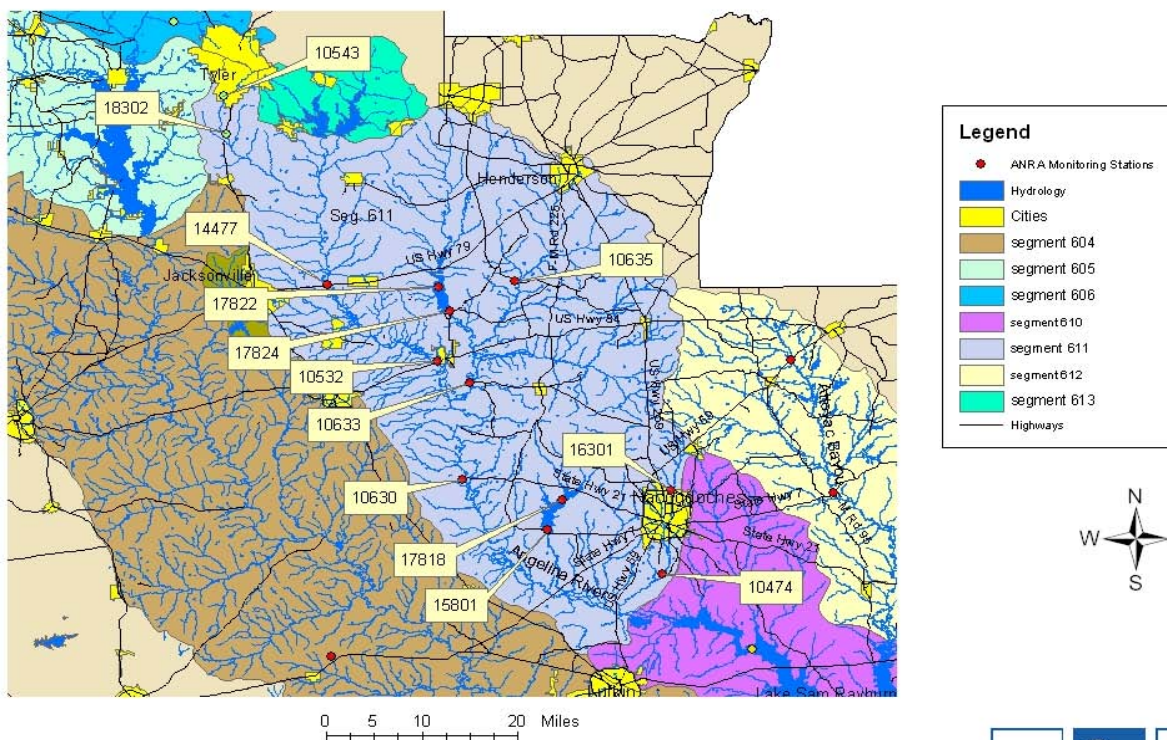
Segment 610 Monitoring Stations FY 2009



Segment 611—FY 2009 CRP Monitoring Schedule

ANRA & City of Tyler Monitoring Stations								
Station ID	Station Description	Program Code	Monitoring Parameters					
			24 HR Monitoring	Metals Water	Conventional	Bacteria	Inst. Flow	Field
10633	Angelina River at SH 204	RT			4	4	4	4
10532	Mud Creek at US 84	RT			4	4	4	4
10474	La Nana Bayou at Nac CR 526	RT			4	4	4	4
16301	La Nana Bayou at Loop 224 N	RT			4	4	4	4
14477	Mud Creek at US 79	RT			4	4	4	4
15801	Lake Nacogdoches at Main Pool	RT			4	4		4
17818	Lake Nacogdoches upper lake	RT			4	4		4
17822	Lake Striker Upper Lake	RT			4	4		4
17824	Lake Striker Near Dam	RT			4	4		4
10630	Angelina River at SH 21	RT			4	4		4
10635	Angelina River at FM 1798	RT			4	4		4
18302	West Mud Creek at US 69 (City of Tyler)	RT			4	4	4	4
10543	West Mud Creek at SSTP (City of Tyler)	RT			4	4	4	4

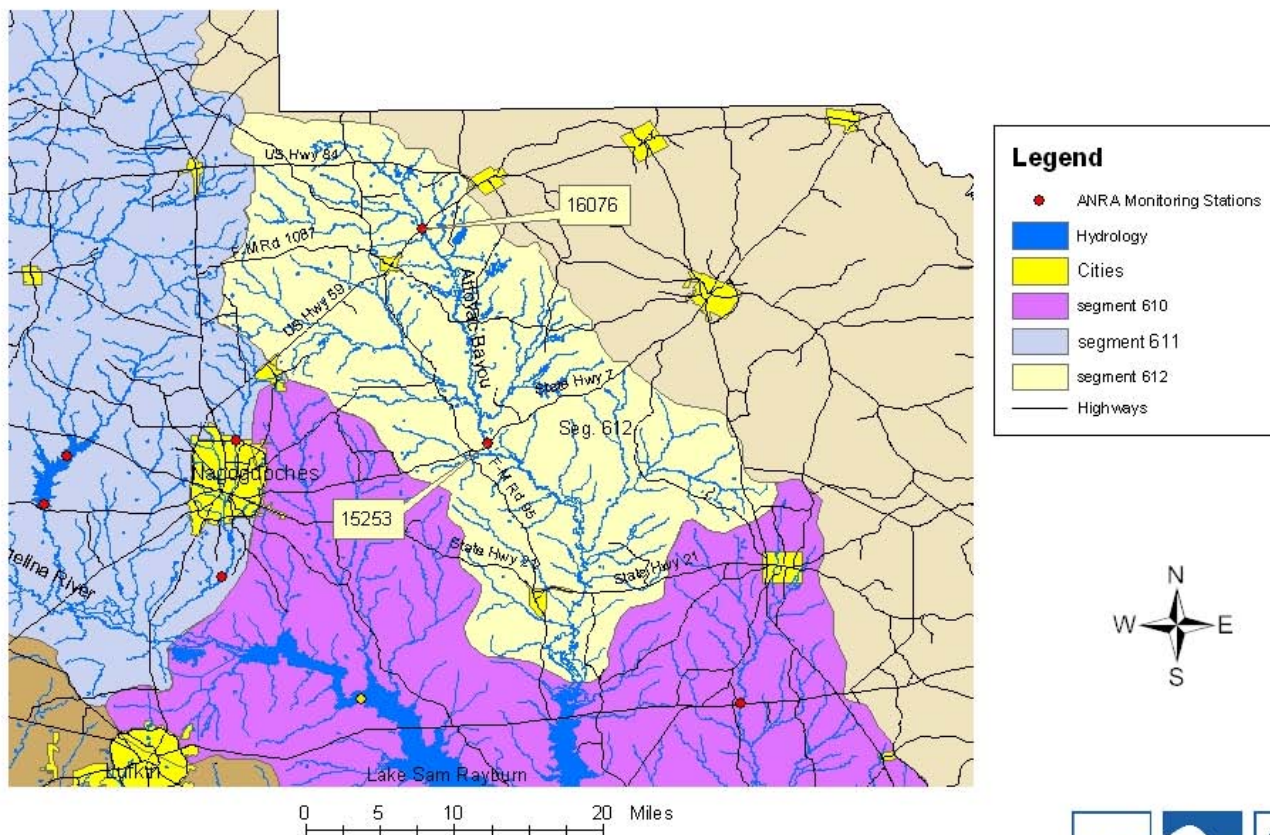
Segment 611 Monitoring Stations FY 2009



Segment 612—FY 2009 CRP Monitoring Schedule

ANRA Monitoring Stations								
Station ID	Station Description	Program Code	Monitoring Parameters					
			24 HR Monitoring	Metals Water	Conventional	Bacteria	Inst. Flow	Field
16076	Attoyac Bayou at US 59	RT			4	4	4	4
15253	Attoyac Bayou at SH 7	RT			4	4	4	4

Segment 612 Monitoring Stations FY 2009



Upper Neches Basin Projects

ANRA's Lake Columbia Water Supply Project Update

Currently, the Lake Columbia project is the US Army Corps of Engineers (USACE) 404 permitting process. This process will address a number of environmental issues. The 404 permit application was filed in the fall of 2002.

Environmental Impact Statement (EIS) Filed

The initial version of the Preliminary Draft EIS was filed on August 14, 2008. Since this time, additional drafts have been submitted incorporating the recommended changes directed by the Corps of Engineers. Once the Corps is satisfied with the document, they will publish a notice seeking public comment on the document. The public comment period will last for 60 days and during that time, a public hearing will be held. ANRA has asked that the public hearing be held in Jacksonville.

How long would it take to fill Lake Columbia?

To fill Lake Columbia – based on historical runoff:

If the wettest season was to repeat itself, the lake would fill in 78 days (based on the runoff that occurred 1/18/1945 - 4/5/1945).

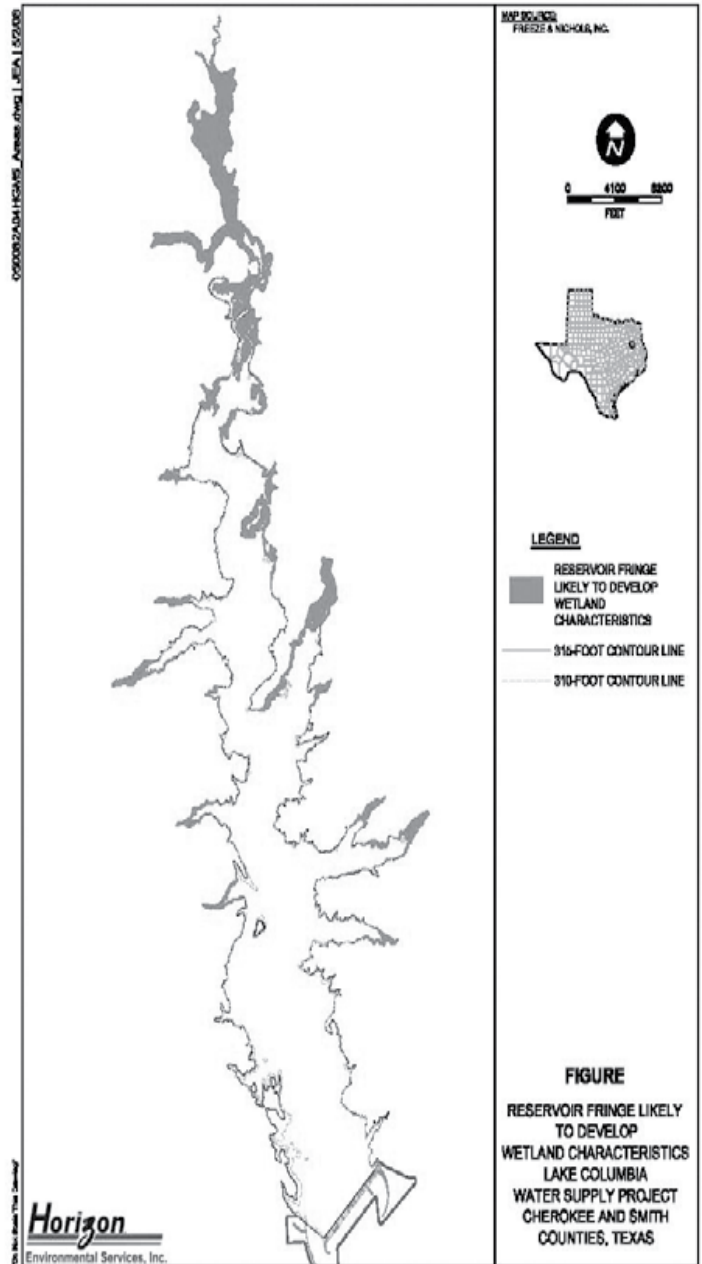
If the driest season was repeated, the lake would take 1,468 days to fill (based on the runoff that occurred 4/16/1962 - 4/22/1966). That is the range of days that it might take Lake Columbia to fill.

ANRA seeks grant funds

On January 14th, 2009, ANRA submitted two Texas Environmental Infrastructure Program (TEIP) grant applications for the Lake Columbia project. The two applications totaled \$16.739 million. The applications competed with 40 other applications received by the Texas Water Development Board for a pool of approximately \$40 million in American Recovery and Reinvestment Act (ARRA) funds. The total dollar value of all applications was in excess of \$210 million. There were not sufficient funds available in the ARRA funding mechanism to recommend funding many of the applications, including ANRA's. ANRA will continue to seek grant funding for components of the reservoir project.

1,200 acres of wetlands expected to be created

While the construction of any reservoir impacts existing wetlands, it also creates the proper environment for the establishment of emergent wetlands. Some areas along the shoreline where the terrain is reasonably flat will become wetlands due to the rise and fall of water levels within the reservoir. In the case of the Lake Columbia project, current estimates indicate that nearly 1,200 acres of wetlands will be created through this process. The map (at right) shows these areas.



For more information regarding Lake Columbia, its participants, project facts, and other information, please visit the Lake Columbia project website at the address below:

www.lakeeastex.org



Stakeholder Participation and Public Outreach

Stakeholder participation and public outreach is an important aspect of the Texas Clean Rivers Program. In fact the Clean Rivers Act states that, "A truly comprehensive watershed assessment program must allow for the participation of stakeholders and other interested parties in the development of water quality objectives and priorities for each river basin". CRP defines a stakeholder as any individual or entity that has a vested interest in the basin's waters, and includes the general public, institutions, government, industry, fee payers, and other interested parties. Stakeholder participation to help determine the direction of each basin's CRP activities is accomplished through the Steering Committee process.

A public outreach program gives the public and concerned citizens an opportunity to stay informed, get involved and make a difference. ANRA's public outreach activities consist of volunteer water quality monitoring, environmental education events, public meetings, and the ANRA web page.

Upper Neches Basin Steering Committee

The Steering Committee for the Upper Neches Basin meets publicly at least once a year in the Lufkin/Nacogdoches area. The Steering Committee provides input to ANRA's Clean Rivers Program and assists in developing water quality objectives, establishing basin priorities, reviewing CRP



ANRA's 2009 Steering Committee Meeting.

work plans, allocating resources, review-

ing major reports, and identifying water quality issues in addition to other activities.

A Steering Committee Meeting was held on April 28, 2008 at the Fredonia Hotel and Convention Center in Nacogdoches, Texas. Topics discussed included the FY 08-09 CRP work plan/ budget, the Draft 2008 Basin Highlights Report, Upper Neches River basin coordinated monitoring schedule, and updates on basin water quality projects. The meeting was well attended and the interactions and discussions were very helpful and informative. The meeting minutes and presentation handouts are currently available on the ANRA web site. Anyone interested in becoming a member of the Steering Committee may contact the ANRA Clean Rivers Project Manager, Matt Romig at (936) 633-6435 or mromig@anra.org for more information.

Volunteer Environmental Monitoring

Volunteer Environmental Monitoring allows anyone interested in the environment and water quality the opportunity to conduct water quality monitoring in areas close to their home. ANRA serves as the Texas Stream Team (formerly known as Texas Watch) regional partner for the Upper Neches Basin and provides training, monitoring kits, and replacement reagents to the volunteer monitors in the basin.

ANRA supports a number of volunteer monitoring groups in the basin. The largest and most active group are members of the Greater Lake Palestine Council (GLPC), a group of representatives from each Property Owner's Association surrounding Lake Palestine. The GLPC is concerned about protecting water quality in Lake Palestine and making other improvements in the area.

All of the data collected by the volunteer monitors is easily accessible via the internet using the data viewer. A link to the data viewer is provided on the following Useful Links page.

ANRA appreciates the efforts of all volunteer monitors in the basin and encourages



Volunteer Water Quality Monitors analyzing water samples at Lake Palestine.

others to participate in the Texas Stream Team Program. For information about ANRA's Volunteer Monitoring Program, please contact Matt Romig at (936) 633-6435 or e-mail info@anra.org. More details on the Texas Stream Team can be found at <http://txstreamteam.rivers.txstate.edu/>

ANRA's Web Page

Another means of reaching the public and providing water quality information is through the ANRA web page at www.anra.org. The ANRA web page is a great place to find out information about the Clean Rivers Program as well as other ANRA projects. The Clean Rivers Program section includes general information about the program and information on how to get involved. The site also includes CRP water quality reports, water quality data, basin-wide coordinated monitoring schedule, GIS maps and helpful links to the TCEQ, Texas Stream Team (formerly Texas Watch), and other CRP planning agencies. The site is routinely updated to include current CRP activities and upcoming events/meetings.

Getting Involved

The Angelina & Neches River Authority strives to involve the public in its activities, whether it is through volunteer monitoring programs, public outreach events, or the Steering Committee process. As water becomes more important everyday, so does the need for water quality monitoring and related projects. For more information, please contact ANRA at (936) 632-7795 or email: info@anra.org.

Useful Links

Angelina & Neches River Authority Clean Rivers Program

http://www.anra.org/index_cleanrivers.htm

Texas Commission on Environmental Quality Clean Rivers Program

<http://www.tceq.state.tx.us/compliance/monitoring/crp/index.html>

The 2008 Water Quality Inventory and 303(d) List

<http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/08twqi/twqi08.html>

Texas Water Quality Coordinated Monitoring Schedule

<http://cms.lcra.org/>

Texas Stream Team Volunteer Monitoring Program

<http://txstreamteam.rivers.txstate.edu/>

Texas Stream Team Data Viewer

<http://txstreamteam.rivers.txstate.edu/Data/Data-Viewer.html>

